

## DESCRIPTION

## ASPIRATING APPARATUS PARTICULARLY FOR TOILETS

The present invention refers to an aspirating apparatus particularly for toilets.

It is known that nowadays the time spent on body hygienics takes an unneigligible fraction of the daytime. The places dedicated the daily toilet, such as the toilets, assume a still growing importance regarding comfort and practicability. In this point of view it is most important that the toilet never presents the typical bad smells produced by the toilet users. One of the most used ways to make a toilet nice and acceptable is to have the room ventilated. A very diffused ventilation means is the centrifugal aspirator typically placed over the toilet bowl. However such aspirator is much in use, in this position it is not free from inconveniences. In fact, owing to the particular position, the time necessary to aspirate the air quantity useful for a quick air change is elevated. The organic smells deriving from a toilet bowl, for example, need to be aspirated quickly to avoid inhalation by the user, whereas the time necessary for the user to stay inside the toilet is less than the time necessary for the air change. Furthermore, the disposition of the aspirator over the toilet bowl is so that the aspirated flow forms an air column from the toilet bowl area where the user is sitting right up to the aspirator mouth; in this air column with its bad smells the toilet user is emerged. Even, in these last years in the field of the resident building there is a

tendency, motivated by lack of useful space and by cost restraining, to realize houses groups having blind bathrooms or toilets. In this kind of toilets the air change obviously results fundamental. The aspirator outlet has to be connected to a chimney vent flue which has to be planned during the construction of the building and thus representing realization costs as well as restraints for the houses groups layout.

A second example of aspirating apparatus for toilets is constituted by traditional aspirating means connected by means of a piping, being rigid in the first section and elastic in the end section, to the posterior part of an ring duct obtained in the seat of a toilet bowl. Said duct along its development is provided with a plurality of openings flowing out on the lower part of the seat in the direction of the bowl cavity. The apparatus is activated by a microswitch placed near to the seat which according to the horizontal/vertical seat position activates or deactivates the aspirating means. The main inconvenience recognized in this solution consists in the fact that the aspirating action is exercised in a position rather distant from the deposition area for urine and faeces which are the origin of the bad smells. A second inconvenience is recognized in the very laborious cleaning of the openings. A third inconvenience is recognized in the fact that the apparatus is deactivated when the toilet bowl is used for urine deposition as the seat is in vertical position.

A third example of aspirating apparatus is disclosed in JP-A-2003096874. It comprises a deodorizing pipe connecting the back wall of

a bowl for water closet to a drain pipe for human waste in order to transfer the smells from the bowl to the drain pipe, a deodorizing fan installed along this deodorizing pipe between said drain pipe and said bowl in order to aspirate smells from said bowl and send it to the drain pipe, a check 5 valve located along the deodorizing pipe upstream the deodorizing fan in order to allow the transfer of the smells only from the bowl to the drain pipe. The main drawback of this solution consists in that the deodorizing pipe leads to the back wall of the bowl where the faeces go down towards the deposition area so that the opening of the deodorizing pipe tends to 10 obstruction. This drawback is made worse by the fact that the washing water doesn't wash the inner surface deodorizing pipe.

A fourth example of aspirating apparatus is disclosed in BE-A-1008428. It comprises a deodorizing pipe connecting a bowl for water closet to a chimney pipe in order to transfer the smells from the bowl 15 outside and a deodorizing fan installed along this deodorizing pipe in order to aspirate smells from said bowl and send it to the chimney pipe. In particular, the deodorizing pipe defines in the bowl a circular duct equipped with a plurality of aspirating openings all around the bowl turning towards the cavity of the bowl and 40 cm distant from the surface of the 20 water inside said cavity. A first drawback of this solution consists in that the aspirating openings are far from the deposit area of the urine and the faeces so that the aspirating action isn't particularly efficacious. A second drawback consists in that the aspirating openings on the back wall of the

bowl where the faeces go down towards the deposition area tend to obstruction. This drawback is made worse by the fact that the washing water doesn't wash the inner surface deodorizing pipe.

The aim of the present invention is to provide an aspirating apparatus particularly for toilets which solves the problems evidenced in

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the prior art types.

Within the scope of the above-mentioned aim, one important object of the present invention is to provide an aspirating apparatus for toilets which limits the inhalation of bad smells by the toilet user.

5 A further important object of the present invention is to provide an aspirating apparatus particularly for toilets which allows to reduce the realization costs concerning aspirating plants for toilets in the houses groups.

An additional object of the present invention is to provide an 10 aspirating apparatus particularly for toilets which allows to optimize, during the projecting stage of the houses groups, the layout of said groups as far as toilet aspirating systems are concerned.

One of the last objects of the present invention is to provide an 15 aspirating apparatus for toilets which can be produced using known systems and technologies.

This aim, as well as these and other objects appearing in the following, are achieved by an aspirating apparatus particularly for toilets according to enclosed main claim.

Further features and advantages of this invention will result 20 apparent from the description of the preferred embodiments, illustrated as indication but not as limitation, in the attached drawings, where:

- figure 1 represents a general diagram of the apparatus according to the invention;

- figure 2 represents a schematic view of an embodiment of the apparatus according to the invention;
- figure 3 represents a diagram of another embodiment of the apparatus according to the invention;

5 – figure 4 represents a top view plan of detail of a first example of toilet bowl for the apparatus according to the invention;

- figure 5 represents a top view plan of detail of a second example of toilet bowl for the apparatus according to the invention;
- figure 6 represents a partly sectional lateral view of a form of apparatus

10 outlet according to the invention.

With particular reference to the mentioned figures 1 and 2 the aspirating apparatus for toilets according to the invention is globally indicated by the reference number 10. Said apparatus 10 comprises an aspirator 11 in the inlet connected operationally to outlet pipe 12 from the flush box 13 of a toilet bowl 14. Said aspirator 11 is operationally in the outlet connected to the outside 14a of the room housing the toilet 14. In details, in this execution form, the aspirator 11 is operationally connected in the outlet to the part of the outfall sewer conduit 16 of said toilet bowl 14 situated downstream the siphon 17 of same toilet. The apparatus 10 comprises flow interception means 18 situated between said part of the outfall sewer conduit 16 of toilet bowl 14 and the outlet pipe 12 of flush box 13, these means are described in the following. Said flow interception means 18 comprises a float check-valve 19, in itself of known type,

disposed upstream the aspirator 11. Moreover, in this described embodiment, said flow interception means 18 also comprises a motor-driven valve for the bidirectional flow blocking 20, either butterfly valve or ball valve of known type, placed downstream said aspirator 11 between 5 said antibackflow valve 15 and said part of outfall sewer conduit 16 of toilet bowl 14. Operationally said motor-driven valve for the bidirectional flow blocking 20 is associated in the functioning to the aspirator 11; in practice when the aspirator 11 is switched off the motor-driven valve 20 is closed, and when the aspirator 11 is functioning the motor-driven valve is 10 open. The aspirator 11 is f. ex. of the type for saunas and is substantially tight being associated to an antibackflow valve 15 of mechanical type, placed downstream the same aspirator and particularly in correspondence with its outlet; said antibackflow valve 15 is part of said interception means 18. The apparatus 10 also comprises a flow gauge 22 placed upstream 15 the aspirator 11; in details, said flow gauge 22 is disposed between said float check-valve 19 and the aspirator 11. If wanted, said flow gauge 22 could be placed downstream aspirator 11. Said flow gauge 22 is operationally associated in the functioning with aspirator 11; in practice when the aspirator is functioning and if the flow gauge 22 does not note 20 the passage of air, it means that there is some obstruction in the plant piping. In this case the aspirator 11 interrupts its functioning. For this reason the float check-valve 19 comprises, in this embodiment, a vibrator (not indicated in the figures) of known type in combination with this valve

type 19, which associated with said flow gauge 22 allows to release the float of the valve 19 when, f.ex. in presence of phenomenons like condensation or other, it tends to remain blocked in its own seat packing.

Together with the flow gauge it is possible to associate a flow display of

5 known type (also not indicated in the figures) such as f.ex. a small swirl inserted into a portion of the piping formed like a loop and equipped with a window upstream the aspirator 11. Said flow display can also be placed downstream the aspirator 11. The apparatus 10 also comprises a presence sensor 23, i.e. a photocell, for an user being near to the toilet

10 bowl 14; said sensor 23 is connected to a time switch (not drawn in the figures) connected with the control of the aspirator 11. If wanted, instead of the presence sensor 23 to actuate the aspirator, it is possible to use a manual push-button control. The aspirator 11 together with the flow gauge 22, the antibackflow valve 15, the float check-valve 19 and the motor-  
15 driven valve for the bidirectional flow blocking 20 are conveniently housed inside a cabinet 30 disposed on the wall next to the toilet bowl; said cabinet 30 is equipped with a door to allow control of the plant working and for handy and easy maintenance.

Figure 4 illustrates a bowl for toilets indicated globally by

20 reference number 114. Said bowl 114 is equipped with a couple of aspirating ducts 131 departing from the back wall of said bowl 114 where they are connected by means of pipings 132 and float check-valves or motor-driven valves to the aspirating means (components not illustrated in

figure 4). Said couple of ducts 131 extends along the lateral walls of said bowl 114 until approximately the area before the outfall 133 of bowl 114. The end portion of said couple of ducts 131 is provided with a plurality of openings 134 communicating with the cavity 135 of bowl 114 and turned 5 towards the outfall area 133 where urines and faeces deposit. This preferred embodiment of the invention offers the advantage to avoid the necessary interventions of realizing the connection between the flush box pipe and the aspirating ducts of the aspirating means.

Figure 5 illustrates a toilet bowl globally indicated by reference number 214. Said bowl 214 is equipped with a U-formed aspirating duct 231 obtained in its front wall and side walls. Said U-formed duct 231 is connected to the end 232 of the back portion of ring duct 233 for the washing water distribution in the cavity 233 of bowl 214. Finally, said U-formed duct 231 along the curved portion is equipped with a plurality of 10 openings 234 communicating with cavity 233 and turning towards the outfall 235 area of the bowl 214 where urines and faeces deposit. This preferred form of the invention has the advantage that the cleanliness of the U-formed duct 231 and the openings 234 is particularly efficient because 15 executed through each flush dispersing the washing water in the ring duct 233 and in the U-formed aspiration duct 231 and running out by means of 20 the openings 234 in the cavity 233 ending into the outfall 235.

According to an embodiment not illustrated in the execution of figure 5, the U-formed duct can be replaced or act together with one or

more ducts provided in the bowl walls as the ducts indicated by reference number 131 of figure 4 connected in the inlet to the ring duct 233 for washing water distribution.

Figure 6 illustrates an embodiment of the apparatus outlet 5 globally indicated by reference number 310. As shown in this figure the aspirating means (not illustrated) are localized inside a wall cabinet 330. Operationally the aspirating means are connected in the inlet to the ring duct for washing water distribution obtained in the walls of the bowl 314 by means of a float check-valve or motor-driven valve (not illustrated in figure 10 6) and a piping 334 joining in the cross-connection from bowl 314 to the box containing the washing water. The aspirating means operationally are connected in the outlet by means of a piping 331 to the exhalation valve 332 of bowl 314. Along the piping 331 which connects the aspiration means and the exhalation valve 332 is positioned a check-valve 333 of 15 motor-driven type, which prevents the return of the smells. Said embodiment of the apparatus outlet offers the advantage of avoiding a suitable chimney vent flue to vent the smells into the free air or into the sewer.

Where the aspirator 11 is located under the flush box 12 the 20 apparatus will be provided with a check-valve on the duct connecting the the bowl 14, 114, 214 and 314 to the aspirator 11 in order to avoid the that washing water rises till the aspirator 11.

The working of the present invention is as follows:

The user approaches the toilet 14 and the aspirator 11 is activated by the signal coming from the presence sensor 23. To the starting of aspirator 11 corresponds an opening signal for the motor-driven valve for bidirectional flow blocking 20. The float check-valve 19 allows passing of the air from 5 outlet pipe 12 of flush box 13 of toilet bowl 14 to the aspirator 11: the airstream lifts the float ball and open the passage; without the airstream the float ball remains in its closing position in its proper seat avoiding the passage in opposite direction of the bad smells remaining trapped in the part between the motor-driven valve for bidirectional flow blocking 20 and 10 the float check-valve 19. The motor-driven valve 20 isolates completely apparatus 10 from the sewer network downstream the toilet bowl siphon 17 during the non-operation step. When a certain time has passed from flush actioning the aspirator will stop working and the motor-driven valve 20 will be closed.

15 In an other version of said apparatus 10 (not evidenced in the figures) said one-way float valve 19 can be replaced by a motor-driven three-way valve of known type. Said motor-driven three-way valve can assume two different conditions: a first condition defined "0" with the aspirator 11 isolated from the outlet pipe 12 but operationnally connected with a place 20 outside toilet 14, and a second condition (of aspiration) defined "1" with said aspirator 11 connected only with said outlet pipe 12. The reason for using this three-way valve is to reduce the residual humid air inside the aspirator during the non-operation steps; in fact during ventilator inactivity,

if the float check-valve 19 is present, the previously aspirated air will remain blocked inside the circuit between the motor-driven valve 20 and the valve 19. The humidity of such blocked air will damage the aspirator 11 as well as the other circuit components. With the motor-driven three-way valve, after the aspiration from the toilet bowl (three-way valve in position "1") commutating the three-way valve in position "0", the aspirator will recall, for a certain piece of time, air from outside the plant replacing it with the humidity saturated air; then the aspirator 11 will switch off, the motor-driven valve for bidirectional flow blocking 20 will close and the three-way valve must be left in position "0"; when the aspiration from the toilet bowl is starting the three-way valve is commutated in position "1". A basic embodiment of the invention, shown in the drawing of figure 3, comprises the aspirator 11, the antibackflow valve 15 which can be not perfectly tight, and the float chek-valve 19 blocking the residual bad smells coming from the sewer downstream the siphon 17 of toilet bowl 14. An alternative embodiment, not shown in the figures, is composed of the aspirator 10 which aspirates from said outlet pipe 12 of flush box 13 of toilet bowl 14 and releases to the outside directly in the atmosphere by means of a chimney vent flue and from the flow interception means 18 such as for ex. the antibackflow valve 15. Other embodiments of the apparatus could comprise automatized commands for flush box discharge combined with the presence sensor 23.

In practice it has been observed that the described apparatus

according to the invention solves the problems evidenced in the known aspirating apparatus for toilets; specially with the present invention it is provided an aspirating apparatus particularly for toilets which permits to aspire from an area of the toilet bowl very next to the origin of the bad 5 smells.

Furthermore, with the present invention it is provided an aspirating apparatus particularly for toilets permitting to discharge the bad smells in the existing sewer network, avoiding therefore the need of chimney vent flues and allowing evident projection and building 10 advantages.

The invention conceived in this way is susceptible of numerous modifications and variants, all of them entering into the ambit of the present invention concept; furthermore all details might be substituted by other technically equivalent elements.

15 In practise, the materials used, on the condition that they are compatible with this specific use, as well as the dimensions might be whichever possible within the limits of the needs and the state of the art.

## CLAIMS

1. Aspirating apparatus particularly for toilets comprising aspirating means (11) with an inlet and an outlet, the inlet being operationally connected to aspirating ducts (131, 231) provided in the walls of a toilet bowl (14, 114, 214, 314) of the aspirating apparatus for use in bathrooms and toilets, the aspirating ducts leading into the cavity inside (135, 233) defined by said walls near to the deposition area of urine and faeces in said cavity (135, 233) in order to allow aspiration of the smells emitted by said urine and faeces next to the deposition area, the outlet of the aspirating means intended to be connected operationally to a different place than the room housing said toilet bowl (14, 114, 214, 314), said aspirating means comprising an aspirator (11) with an inlet and an outlet, the inlet being operationally connected to the outlet pipe (12) of flush box (13) of a toilet bowl (14), said outlet pipe leading in the ring duct (233) for the washing water distribution in said cavity (233) of said bowl (214), and the outlet of the aspirator intended to be connected operationally to a place outside the room housing said toilet bowl (14), characterized in that said aspirating ducts are formed by formed ducts (131, 231), obtained in the front wall and side walls of said bowl (214), connected to the ends (232) of the back portion of said ring duct (233) for the washing water distribution in said cavity (233) of said bowl (214), said ducts (131, 231) along the curved portion being equipped with a plurality of aspirating openings (234) communicating with said cavity (233) and turning towards

the outfall area (235) of said bowl (214) where urines and faeces deposit.

2. Aspirating apparatus, according to claim 1, characterized in that said aspirating ducts are formed by one or more ducts (131) departing from the back wall of said bowl (114) where they are connected by means of pipings 132 to said aspirating means; said couple of ducts (131) extending along the lateral walls of said bowl until approximately the area before the outfall (133) of said bowl (114), as the final portion of said couple of ducts (131) is provided with a plurality of aspirating openings (134) communicating with said cavity (135) and turning towards said outfall area (133) where urines and faeces deposit.

3. Aspirating apparatus, according to the foregoing claim, characterized in that it comprises an antibackflow valve (15) placed downstream said aspirator (11).

4. Aspirating apparatus, according to one or more of the foregoing claims, characterized in that said aspirator (11) is operationally connected in the outlet to the part of the outfall sewer conduit (16) of said toilet bowl (14) placed downstream the siphon (17) of same toilet bowl (14), said system (10) comprises flow interception means (18) disposed between said part of the outfall sewer conduit (16) of said toilet bowl (14) and the outlet pipe (12) of flush box (13).

5. Aspirating apparatus, according to the foregoing claim, characterized in that said flow interception means (18) comprises a float check-valve (19) placed upstream said aspirator (11).

6. Aspirating apparatus, according to one or more of the foregoing claims, characterized in that it comprises a flow gauge (22) placed downstream, or upstream, said aspirator (11); said flow gauge (22) is operationally connected to the aspirator (11).

5 7. Aspirating apparatus, according to claims 5 and 6, characterized in that said float check-valve (19) comprises a vibrator, associated with said flow gauge (22), to release the float ball when it is blocked in its proper seat.

8. Aspirating apparatus, according to claim 4, characterized in that said 10 flow interception means (18) comprises a motor-driven three-way valve placed upstream said aspirator (11).

9. Aspirating apparatus, according to one or more of the foregoing claims, characterized in that said flow interception means (18) comprises a motor-driven valve for the bidirectional flow blocking (20) placed 15 downstream said aspirator (11).

10. Aspirating apparatus, according to one or more of the foregoing claims, characterized in that it comprises a flow display placed downstream, or upstream, said aspirator (11); said flow display is operationally connected to said aspirator (11).

20 11. Aspirating apparatus, according to one or more of the foregoing claims, characterized in that it comprises a presence sensor (23) for an user being next to said toilet bowl (14).

12. Aspirating apparatus, according to the foregoing claim, characterized

in that said presence sensor (23) is composed of a photocell operationally connected to a time switch and to the control of said aspirator (11).

13. Aspirating apparatus, according to claim 4, characterized in that said flow interception means (18) comprises an antibackflow valve (15) placed downstream said aspirator (11).

14. Aspirating apparatus, according to one or more of the foregoing claims, characterized in that said aspirating means are connected by means of a piping (331) to the exhalation valve (332) of said bowl (314).

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## **ABSTRACT OF THE DISCLOSURE**

An aspirating apparatus for toilets includes an aspirator operationally connected at an inlet side to an outlet pipe from a flush box of a toilet bowl and at an outlet side to the exterior of the bathroom of the toilet housing the toilet bowl. The aspirator is operationally connected at the outlet to a part of the outfall sewer conduit of the toilet bowl placed downstream of the toilet bowl's siphon. Flow interception means are placed between this part of the outfall sewer conduit and the outlet pipe from the flush box.

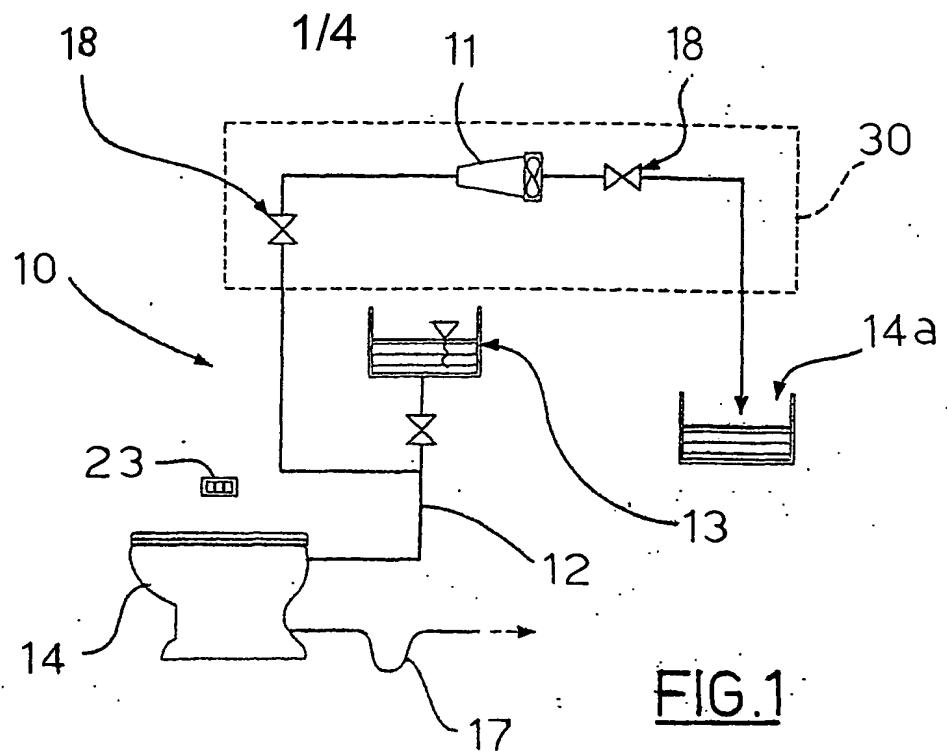


FIG.1

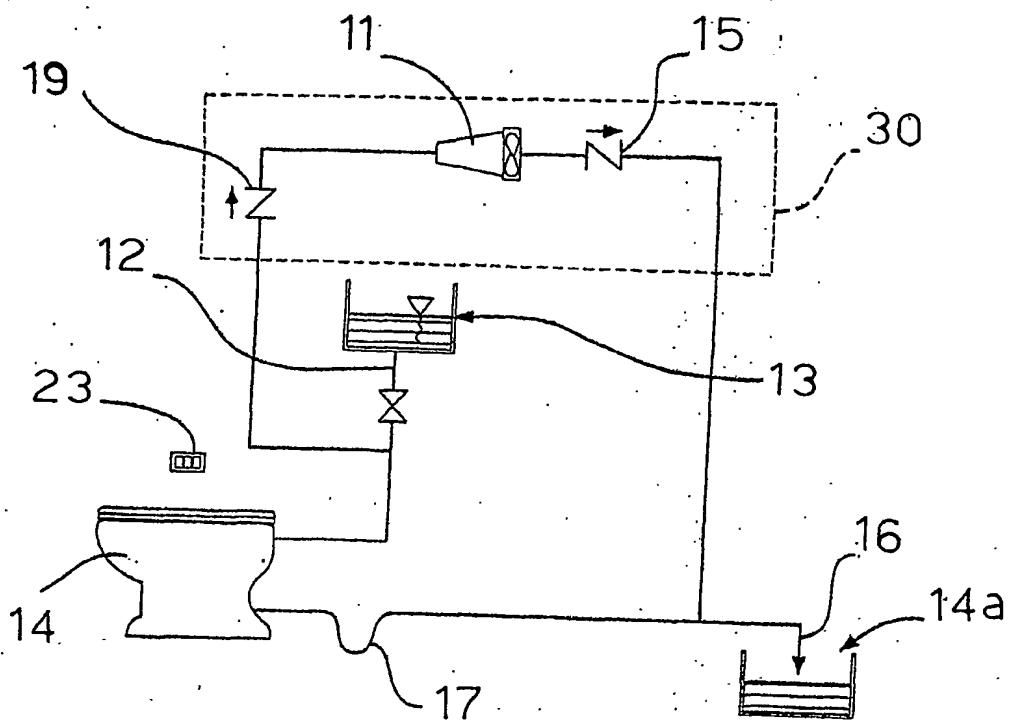


FIG.3

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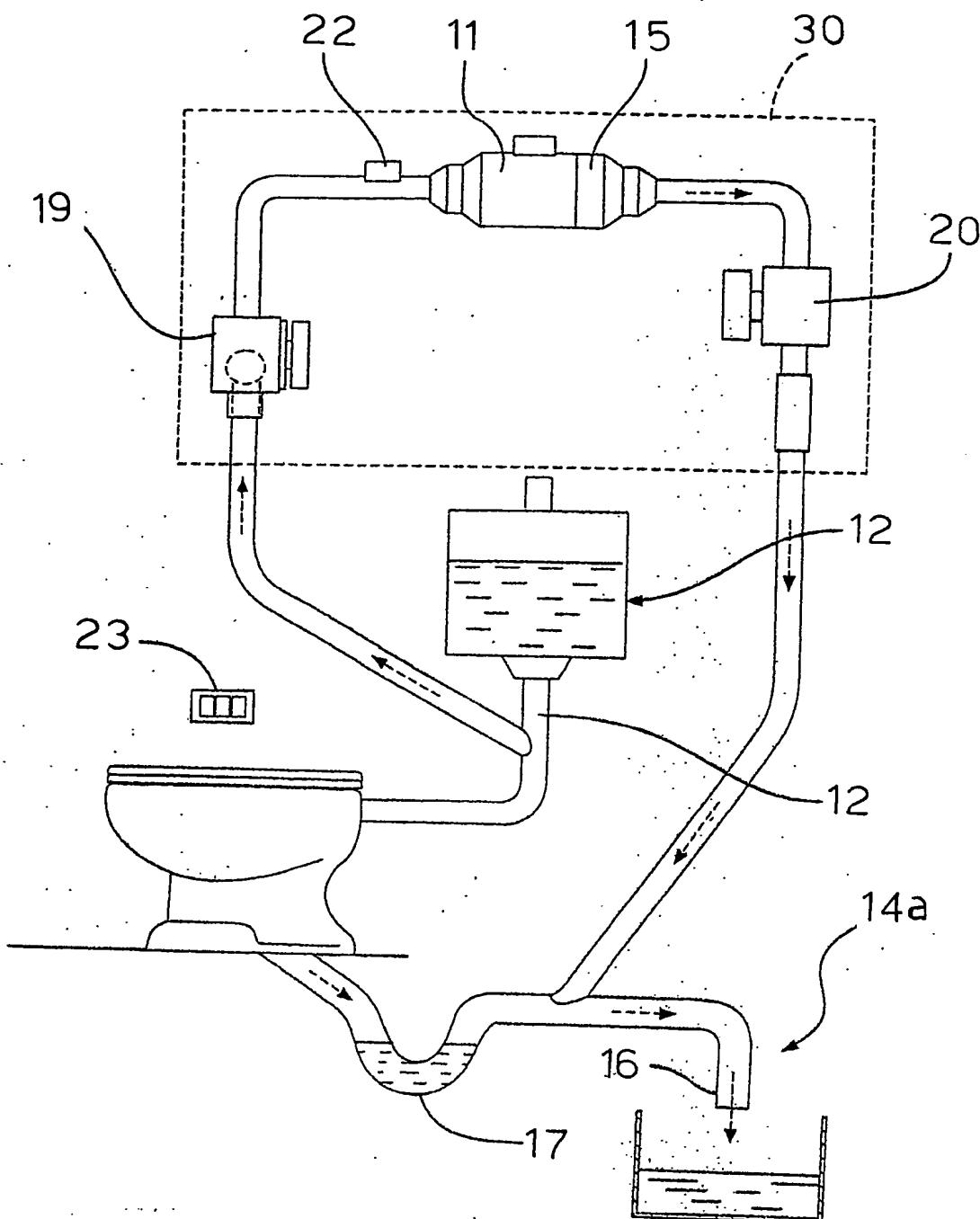
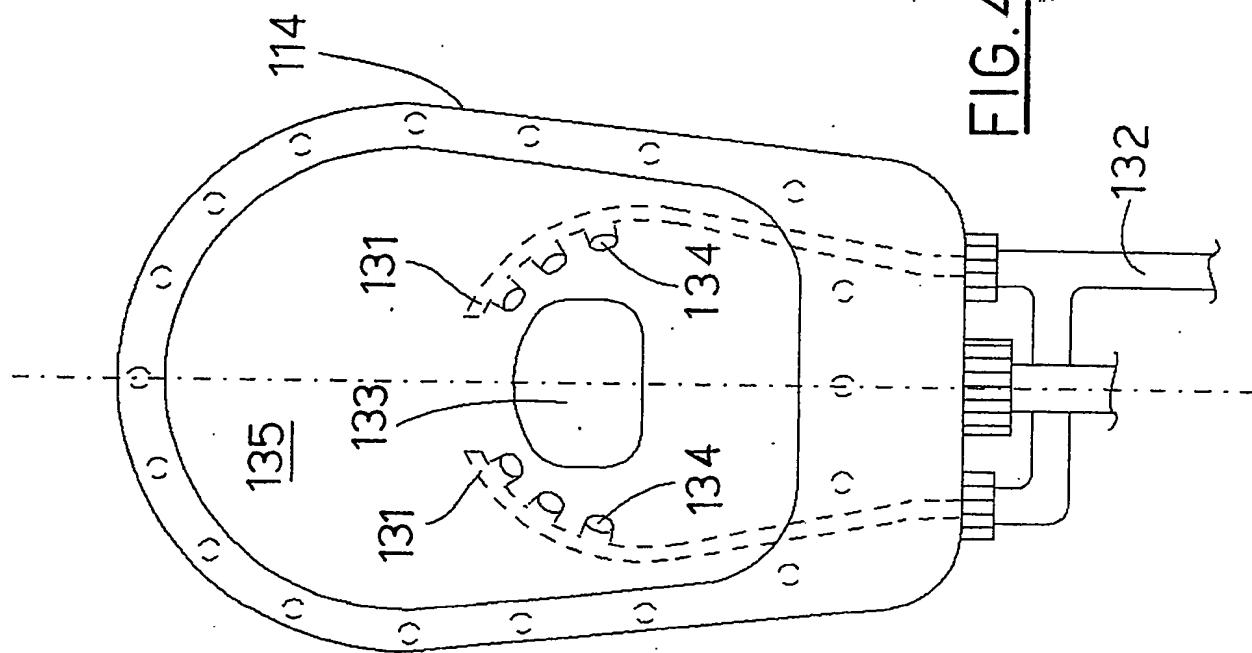
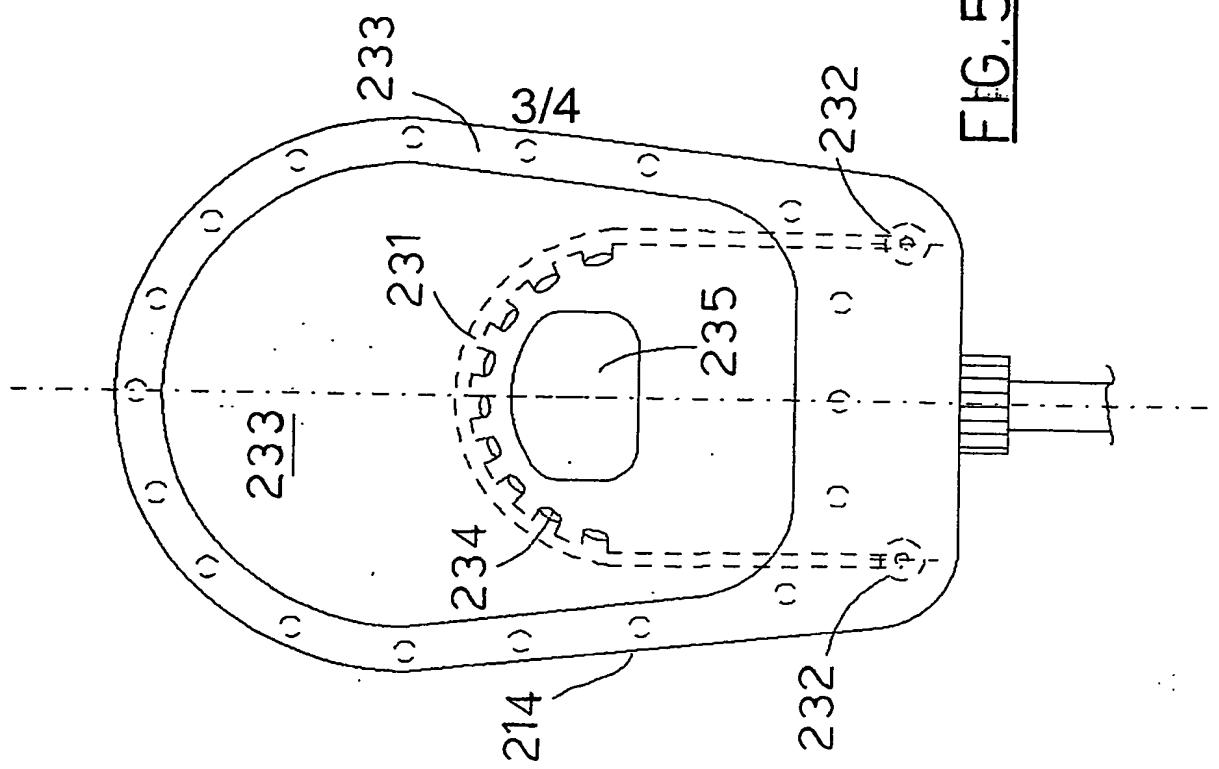


FIG. 2



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